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10/532,904	04/27/2005	Peter-Andre Redert	NL 021087	3107

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EXAMINER

LA BARR, EDWARD T

ART UNIT	PAPER NUMBER
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2628

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04/16/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/532,904	Applicant(s) REDERT ET AL.	
	Examiner Edward T. La Barr	Art Unit 2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 January 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

This action comes in response to Applicants' amendment received 1/11/2008. Applicants have added new claims 16 and 17. Claims 1-17 are pending.

Specification

Applicants have amended the specification to remove phrases that can be implied in accordance with MPEP § 608.01(b). Accordingly, this rejection to the specification is withdrawn.

Claim Rejections - 35 USC § 112

Claims 4, 9, 14 and 15 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as his invention. Applicant has amended these claims to render them definite. Accordingly, these rejections to the claims are withdrawn.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

Art Unit: 2628

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 4, 5 and 6 - 10 are rejected under 35 U.S.C. 102(e) as being anticipated by Gelsey (US Pat. No. 6,344,837).

Regarding Claim 1. (Currently Amended)

Method for visualisation of a 3-dimensional (3-D) image comprising:

converting a 3-D scene model (See e.g. col. 9 lines 4-5) into a plurality of 3-D scene points (See e.g. col. 9 lines 4-10 where the 3-D scene point is the point where R intercepts S. See also e.g. Figs 1, 2 and 3);

providing at least a portion of the plurality of 3-D scene points to a 3-D display plane comprising 3-D pixels that are directionally modulated (See e.g. col. 9 lines 25-29, where SP = scene point, and DMP = 3-D pixel);

determining at each of the 3-D pixels a contribution of light from the 3-D pixel to generate at least in part a scene point of the plurality of 3-D scene points (Applicant defines 3-D pixel as “may be a device comprising a spatial light modulator ... may contain light sources, lenses, spatial light modulators and a control unit” at Application Specification p.2 lines 18-21.

In this view, See e.g. Gelsey Claims 32 “control mechanism” and col. 9 lines 25-29 as above);
and

performing at least one of emitting and transmitting the light by each of the 3-D pixels that is determined to contribute to the scene point (See e.g. Fig 3 block 10 and Fig. 4A and See e.g. Abstract “DMP”).

Regarding Claim 2. (Original)

Gelsey discloses a method according to claim 1, characterized in that light is emitted and/or transmitted by 2-D pixels comprised within said 3-D pixels, each 2-D pixel directing light into a different direction contributing light to a scene point of said 3-D scene model (Applicant defines 2-D pixel as “may be a device that can modulate the emission or transmission of light” at Application Specification p. 2 lines 17-18. In this view, See e.g. Gelsey col. 4 line 54 through col. 5 line 8 especially “centrally located point source of light within ... modulation regions” and “light emitted in different directions having the different visual properties appropriate for the scene being displayed.”)

Regarding Claim 4. (Original)

Gelsey discloses a method according to claim 1, characterized in that the contribution of light of a 3-D pixel to a certain 3-D scene point is made previous to the provision of said 3-D scene points to said 3-D pixels (See e.g. col. 10 lines 1-11. See also Fig. 14, where scene point SP is set equal to Intercept (R,S) in block 72, followed by provision of the scene points to the 3-D pixel in block 74 by setting the modulation region to match SP).

Regarding Claim 5. (Original)

Gelsey discloses a method according to claim 1, characterized in that the contribution of light of a 3-D pixel to a certain 3-D scene point is calculated within one 3-D pixel of one row or of one column previous to the provision of said 3-D scene points to the remaining 3-D pixels of a row or a column, respectively. (See e.g. col. 10 lines 1-11. See also Fig. 14, where scene point SP is set equal to Intercept (R,S) in block 72, followed by provision of the scene points to the 3-D pixel in block 74 by setting the modulation region to match SP).

Regarding Claim 6. (Original)

Gelsey discloses a method according to claim 1, characterized in that a 3-D pixel outputs an input 3-D scene point to at least one neighboring 3-D pixel (See e.g. col. 9 lines 14-35 where neighboring 3-D pixel is line 17 "... next DMP ..." and 3-D scene point is SP).

Regarding Claim 7. (Original)

Gelsey discloses a method according to claim 1, characterized in that each 3-D pixel alters the co-ordinates of a 3-D scene point prior to putting out said 3-D scene point to at least one neighbouring 3-D pixel (See e.g. col. 9 lines 4-35, where the scene point SP is defined as the point intercept (R,S) in Step 72. In this view See Fig. 13 where the coordinate of the scene point depends therefore on R, this step occurring prior to decision 78 which passes the data to the next 3-D pixel).

Regarding Claim 8. (Original)

Gelsey discloses a method according to claim 1, characterized in that in case more than one 3-D scene point needs the contribution of light from one 3-D pixel, the depth information of said 3-D scene point is decisive (See e.g. col. 4 lines 49-53 where occlusion depends on viewing direction.)

Regarding Claim 9. (Currently Amended)

Gelsey discloses a method according to claim 1, characterized in that 2-D pixels of the 3-D display plane transmit and/or emit light only within one plane (See e.g. col. 6 lines 1-24, esp. 18-19).

Regarding Claim 10. (Original)

Gelsey discloses a method according to claim 1, characterized in that colour is incorporated by spatial or temporal multiplexing within each 3-D pixel (See e.g. col. 5 lines 8-24 and Fig. 5. See also col. 5 lines 55-65).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3 and 11-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gelsey (US Pat. No. 6,344,837) as applied to Claims 1, 2, 4, 5 and 6 - 10 above, in view of Norman (US Pat. No. 6,154,855).

Regarding Claim 3. (Original)

Gelsey does not explicitly disclose the method according to claim 1, characterized in that said 3-D scene points are provided sequentially, or in parallel, to said 3-D pixels. However, Norman teaches the use of arrays of processors (See e.g. Norman col. 2 lines 30-45, col. 7 lines 38-46 and col. 9 lines 13-21).

It would have been obvious to persons having ordinary skill in the art at the time of invention to provide 3-D scene points to 3-D pixels sequentially or in parallel. It was known that a highly parallel data processing system can have the advantage of overcoming the I/O and memory bottlenecks that plague parallel processors as well as the von Neumann bottleneck of single processor architectures (See e.g. Norman col. 9 lines 27-36).

Regarding Claim 11. (Currently Amended)

Gelsey discloses the following elements as developed in claim 1 above:

A 3-D display device, comprising: a 3-D display plane with 3-D pixels, each of said 3-D pixels comprise a control unit for calculating their own contribution to the visualization of a 3-D scene point representing said 3-D scene.

Gelsey does not explicitly disclose, but Norman teaches an input port and an output port for receiving and putting out 3-D scene points of a 3-D scene. (See e.g. Norman col. 32 lines 13-20 where “array cell” comprises a 3-D pixel).

It would have been obvious to persons having ordinary skill in the art at the time of invention to incorporate an input and an output port for receiving and putting out 3-D scene points of a 3-D scene. It was known that having cells equipped with direct input and direct output means allows the array to handle input intensive tasks without encountering an input bottleneck (See e.g. Norman col. 32 lines 22-25.)

Regarding Claim 12. (Original)

Gelsey does not explicitly disclose a 3-D display device according to claim 11, characterized in that said 3-D pixels are interconnected for parallel and serial transmission of 3-D scene points. However, Norman teaches the use of arrays of processors (See e.g. Norman col. 2 lines 30-45, col. 7 lines 38-46 and col. 9 lines 13-21).

It would have been obvious to persons having ordinary skill in the art at the time of invention to interconnect 3-D pixels for parallel and serial transmission of 3-D scene points. It was known that a highly parallel data processing system can have the advantage of overcoming

the I/O and memory bottlenecks that plague parallel processors as well as the von Neumann bottleneck of single processor architectures (See e.g. Norman col. 9 lines 27-36).

Regarding Claim 13. (Original)

Gelsey in view of Norman disclose a 3-D display device according to claim 11, characterized in that said 3-D pixels comprise a spatial light modulator with a matrix of 2-D pixels (See e.g. Gelsey Fig. 5.)

It would have been obvious to persons having ordinary skill in the art at the time of invention to utilize a 3-D pixel comprising a spatial light modulator and a matrix of 2-D pixels. It was known that using a matrix of 2-D pixels and a spatial light modulator can have the advantage of the pixels appearing to combine so that the single 3-D pixel may imitate several distinct 3-D pixels (See e.g. Gelsey col. 5 lines 8-24 where 3-D pixel is “DMP”).

Regarding Claim 14. (Currently Amended)

Gelsey in view of Norman discloses a 3-D display device according to claim 13, characterized in that said 3-D pixels comprise a point light source, providing said 2-D pixel with light. (See e.g. Gelsey col. 4 lines 54-55 and see generally Gelsey col. 4 line 54 through col. 5 line 54 and Fig. 4C).

It would have been obvious to persons having ordinary skill in the art at the time of invention to use a point light source to provide light. It was known that the light emitted from a point source through a Directionally Modulated Pixel can have the advantage of emitting

nonuniform light in different directions appropriate for the scene being displayed (See e.g. Gelsey col. 4 line 54 through col. 5 line 8).

Regarding Claim 15. (Currently Amended)

Gelsey does not explicitly disclose a 3-D display device according to claim 13, characterized in that said 3-D pixels comprise registers for storing a value determining which ones of said 2-D pixels within said 3-D pixel contribute light to a 3-D scene point.

However, Norman teaches the use of arrays of processors where each processor has its own memory (See e.g. Norman Fig. 10 block 1016, See also col. 2 lines 30-34).

It would have been obvious to persons having ordinary skill in the art at the time of invention to incorporate registers for storing a value determining which pixels contribute light to a 3-D scene point. It was known that systems comprising arrays of processors where each processor has its own memory can have the advantage of removing the von Neumann uni-processor bottleneck and the multi-processor memory bottleneck for parallel applications (See e.g. Norman col. 2 lines 34-36).

Claims 3 and 11-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gelsey (US Pat. No. 6,344,837) as applied to Claims 1, 2, 4, 5 and 6 - 10 above, in view of Norman (US Pat. No. 6,154,855) and Seitz, et al. (US Pat. No. 6,363,170).

Regarding Claim 16. (New)

The method of claim 1, wherein the determining of the contribution comprises determining whether a current 3-D scene point is closer to a viewer than a past 3-D scene point.

(See e.g. Seitz, et al. col. 6 l. 66 - col. 7 l. 7. Here, voxel processing involves 1-bit Z-buffering, or occlusion detection which determines whether the current scene pixel is closer to a viewer than the previous 3-D scene point.) It would have been obvious for persons having ordinary skill in the art to determine relative depth of a scene point. It was known that use of depth testing can have the advantages of reducing required processing and preventing display of hidden surfaces.

Regarding Claim 17. (New)

The 3-D display device of claim 11, wherein the control unit determines whether a current 3-D scene point is closer to a viewer than a past 3-D scene point.

(See e.g. Seitz, et al. col. 6 l. 66 - col. 7 l. 7. Here, voxel processing involves 1-bit Z-buffering, or occlusion detection which determines whether the current scene pixel is closer to a viewer than the previous 3-D scene point.) It would have been obvious for persons having ordinary skill in the art to determine relative depth of a scene point. It was known that use of depth testing can have the advantages of reducing required processing and preventing display of hidden surfaces.

Response to Arguments

Applicants' arguments filed 1/11/2008 have been fully considered but are not persuasive.

Applicants' arguments are directed toward the following limitation from the amended claims:

“...determining at each of the 3-D pixels a contribution of light from the 3-D pixel to generate at least in part a scene point of the plurality of 3-D scene points...”

It is argued that the Gelsey reference (US Pat. No. 6,344,837) from the prior action “...describes the use of a centralized computer to determine the light modulation for each of its directionally modulated pixels...”, and therefore does not disclose or suggest the new quoted limitation from the amended claims. This argument is nonpersuasive for the following reasons:

1) By arguing that determination of light modulation using a centralized computer does not read on this claim, Applicants' seem to imply that this claim language requires decentralized determination. However the language “...determining at each of the 3-D pixels a contribution of light...” can be interpreted to mean that the contribution “at the 3-D pixel” is calculated elsewhere. In this view, Gelsey clearly reads on this claim.

2) Applicants cite the following passage from Gelsey:

“Apparatus for controlling the [Image Display Device] 12 as shown ... each [Directionally Modulated Pixel] 14 is a tiny liquid crystal screen 18 which can be electronically controlled by a computer just as a conventional liquid crystal screen is controlled. In the present system for a 3D image display, each of the DMPs 14 in the IDD 12 is simultaneously connected to the controlling computer 54.” (col. 8 ll. 26-33) .

However, the DMP is part of, and directs the light emanating from, what is termed a 3-D pixel in the instant application. In the passage, determination of a contribution of light is made at the DMP (and therefore the 3-D pixel) based upon the control signal from the computer, e.g. via the underlying control hardware for the DMP. In this way, a particular configuration of the LCD type screen is turned on or off, for example, determining the contribution. See also e.g. Fig. 14 block 74 and Fig. 15 block 90.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

The following prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

6,329,963 Chiabrera, et al. teach multiple stereoscopic radiating elements;

6,680,792 Miles, Mark W. teaches teaches a 2D SLM pixel array with a single input and output;
2003/0156077 and 6,999,071 Balogh, Tibor teaches a 3D SLM 3-D pixel array
5,446,479 Thompson et al. teach a Multi-Processor 3D SLM display system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edward T. La Barr whose telephone number is (571)270-3237. The examiner can normally be reached on Monday-Friday, 9:00 a.m - 5:00 p.m., Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571) 272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ETL

/Ulka Chauhan/
Supervisory Patent Examiner, Art Unit 2628